

MOSFET – Dual, N-Channel, POWERTRENCH®

40 V, 98 A , 2.6 mohm

FDMD8240L

Description

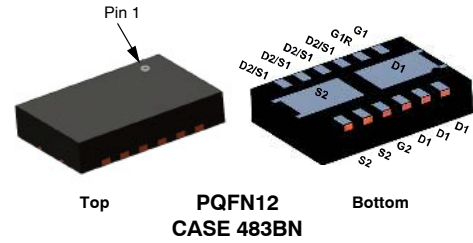
This device includes two 40 V N-Channel MOSFETs in a dual Power (3.3 mm X 5 mm) package. HS source and LS Drain are internally connected for half/full bridge, low source inductance package, low $R_{DS(on)}/Q_g$ FOM silicon.

Features

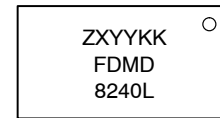
- Max $R_{DS(on)}$ = 2.6 m Ω at V_{GS} = 10 V, I_D = 23 A
- Max $R_{DS(on)}$ = 3.95 m Ω at V_{GS} = 4.5 V, I_D = 19 A
- Ideal for Flexible Layout in Primary Side of Bridge Topology
- 100% UIL Tested
- Kelvin High Side MOSFET Drive Pin-out Capability
- This Device is Pb-Free, Halide-Free and is RoHS Compliant

Applications

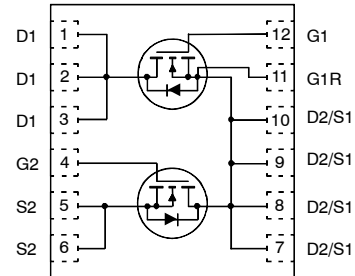
- Synchronous Buck : Primary Switch of Half / Full Bridge Converter for Telecom
- Motor Bridge : Primary Switch of Half / Full bridge Converter for BLDC Motor
- MV POL: Synchronous Buck Switch



MARKING DIAGRAM



- Z = Assembly Plant Code
- XYY = Date Code (Year & Week)
- KK = Lot Traceability Code
- FDMD8240L = Specific Device Code



ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------|---------------------|-----------------------|
| FDMD8240L | PQFN12 (Pb-Free) | 3000 / Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](#).

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MOSFET MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | | Ratings | Unit | |
|----------------|--|---------------------------------------|---------------------------------------|------------------|---|
| V_{DS} | Drain to Source Voltage | | 40 | V | |
| V_{GS} | Gate to Source Voltage | | ± 20 | V | |
| I_D | Drain Current | Continuous | $T_C = 25^\circ\text{C}$ (Note 5) | 98 | A |
| | | Continuous | $T_C = 100^\circ\text{C}$ (Note 5) | 62 | |
| | | Continuous | $T_A = 25^\circ\text{C}$ (Note 1a) | 23 | |
| | | Pulsed (Note 4) | – | 464 | |
| E_{AS} | Single Pulse Avalanche Energy (Note 3) | | 216 | mJ | |
| P_D | Power Dissipation | $T_C = 25^\circ\text{C}$ | 42 | W | |
| | Power Dissipation | $T_A = 25^\circ\text{C}$ (Note 1a) | 2.1 | | |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | | -55 to +150 | $^\circ\text{C}$ | |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

| Symbol | Parameter | Ratings | Unit |
|-----------------|---|---------|---------------------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 3.0 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 1a) | 60 | |

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|--------|-----------|-----------------|-----|-----|-----|------|
|--------|-----------|-----------------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|--------------------------------------|---|--|----|----|-----------|----------------------------|
| BV_{DSS} | Drain-to-Source Breakdown Voltage | $I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$ | 40 | – | – | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$, referenced to 25°C | – | 23 | – | $\text{mV}/^\circ\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 32 \text{ V}, V_{GS} = 0 \text{ V}$ | – | – | 1 | μA |
| I_{GSS} | Gate-to-Source Leakage Current | $V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$ | – | – | ± 100 | nA |

ON CHARACTERISTICS

| | | | | | | |
|--|--|--|-----|-----|------|----------------------------|
| $V_{GS(th)}$ | Gate-to-Source Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$ | 1.0 | 2.0 | 3.0 | V |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate-to-Source Threshold Voltage Temperature Coefficient | $I_D = 250 \mu\text{A}$, referenced to 25°C | – | –6 | – | $\text{mV}/^\circ\text{C}$ |
| $R_{DS(on)}$ | Static Drain-to-Source On Resistance | $V_{GS} = 10 \text{ V}, I_D = 23 \text{ A}$ | – | 2.0 | 2.6 | m Ω |
| | | $V_{GS} = 4.5 \text{ V}, I_D = 19 \text{ A}$ | – | 3.2 | 3.95 | |
| | | $V_{GS} = 10 \text{ V}, I_D = 23 \text{ A}, T_J = 125^\circ\text{C}$ | – | 3.0 | 3.9 | |
| g_{FS} | Forward Transconductance | $V_{DD} = 5 \text{ V}, I_D = 23 \text{ A}$ | – | 107 | – | S |

DYNAMIC CHARACTERISTICS

| | | | | | | |
|-----------|------------------------------|--|-----|------|------|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 20 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$ | – | 3020 | 4230 | pF |
| C_{oss} | Output Capacitance | | – | 876 | 1230 | |
| C_{rss} | Reverse Transfer Capacitance | | – | 33 | 52 | |
| R_g | Gate Resistance | | 0.1 | 2.8 | 6 | Ω |

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ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|----------------------------------|-------------------------------|--|-----|-----|-----|------|
| SWITCHING CHARACTERISTICS | | | | | | |
| t _{d(on)} | Turn-On Delay Time | V _{DD} = 20 V, I _D = 23 A, V _{GS} = 10 V, R _{GEN} = 6 Ω | – | 12 | 22 | ns |
| t _r | Rise Time | | – | 8 | 16 | |
| t _{d(off)} | Turn-Off Delay Time | | – | 36 | 58 | |
| t _f | Fall Time | | – | 9 | 18 | |
| Q _{g(tot)} | Total Gate Charge | V _{GS} = 0 V to 10 V, V _{DD} = 20 V, I _D = 23 A | – | 40 | 56 | nC |
| | Total Gate Charge | V _{GS} = 0 V to 5 V, V _{DD} = 20 V, I _D = 23 A | – | 21 | 30 | |
| Q _{gs} | Gate-to-Source Charge | V _{DD} = 20 V, I _D = 23 A | – | 9 | – | |
| Q _{gd} | Gate-to-Drain “Miller” Charge | V _{DD} = 20 V, I _D = 23 A | – | 5 | – | |

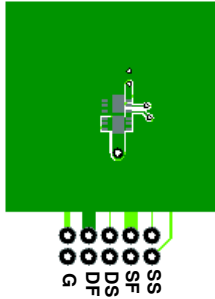
DRAIN-SOURCE DIODE CHARACTERISTICS

| | | | | | | |
|-----------------|---------------------------------------|--|---|-----|-----|----|
| V _{SD} | Source-to-Drain Diode Forward Voltage | V _{GS} = 0 V, I _S = 23 A (Note 2) | – | 0.8 | 1.3 | V |
| | | V _{GS} = 0 V, I _S = 1.6 A (Note 2) | – | 0.7 | 1.2 | |
| t _{rr} | Reverse Recovery Time | I _F = 23 A, di/dt = 100 A/μs | – | 41 | 65 | ns |
| Q _{rr} | Reverse Recovery Charge | | – | 21 | 32 | nC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

- R_{θJA} is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR-4 material. R_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



a) 60°C/W when mounted on a 1 in² pad of 2 oz copper



b) 130°C/W when mounted on a minimum pad of 2 oz copper

- Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
- E_{AS} of 216 mJ is based on starting T_J = 25 °C, L = 3 mH, I_{AS} = 12 A, V_{DD} = 40 V, V_{GS} = 10 V. 100% tested at L = 0.1 mH, I_{AS} = 37 A.
- Pulsed I_d please refer to Figure 11 SOA graph for more details.
- Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

TYPICAL CHARACTERISTICS

($T_J = 25^\circ\text{C}$ unless otherwise noted)

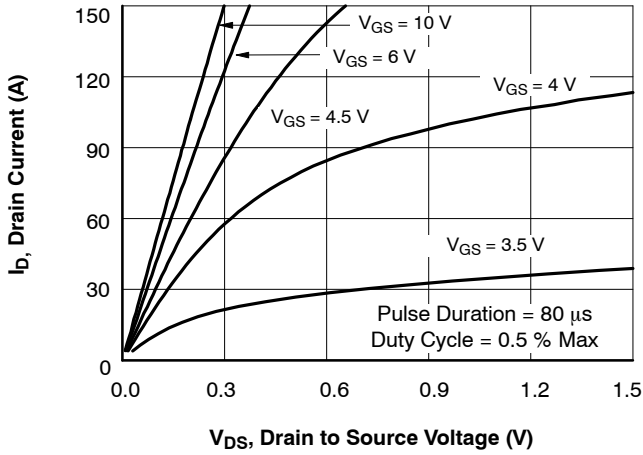


Figure 1. On-Region Characteristics

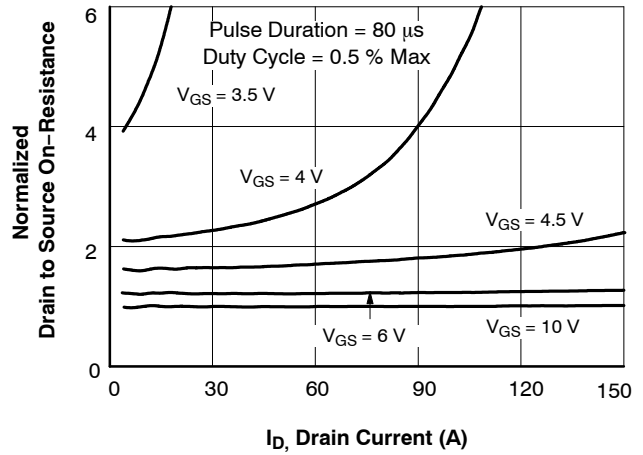


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

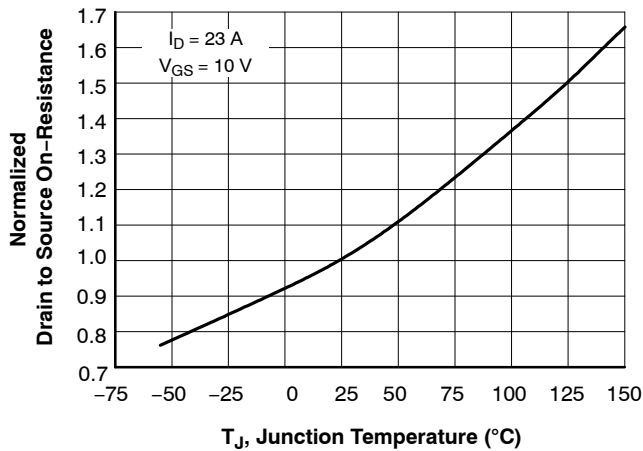


Figure 3. Normalized On-Resistance vs. Junction Temperature

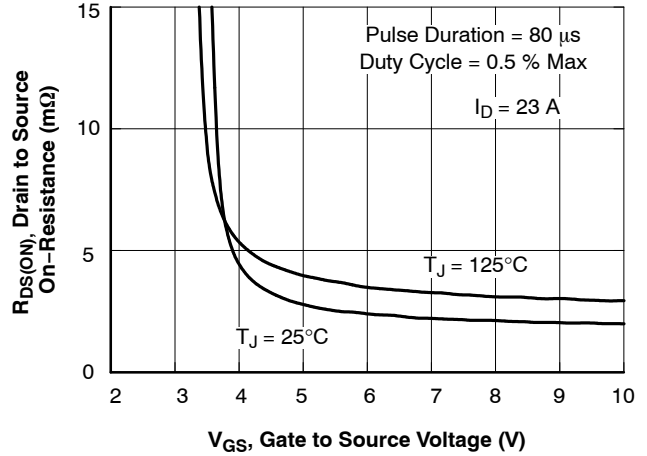


Figure 4. On-Resistance vs. Gate to Source Voltage

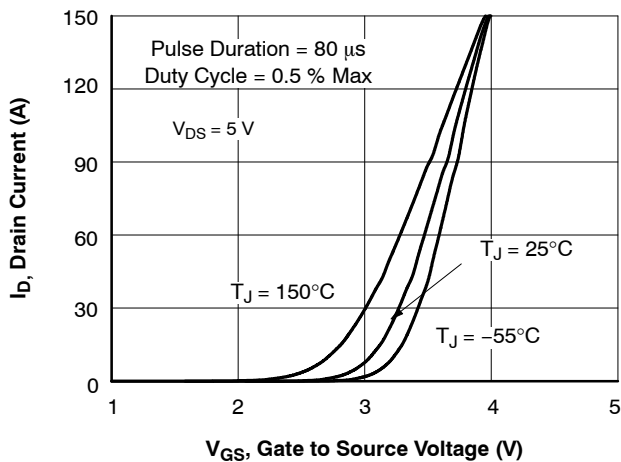


Figure 5. Transfer Characteristics

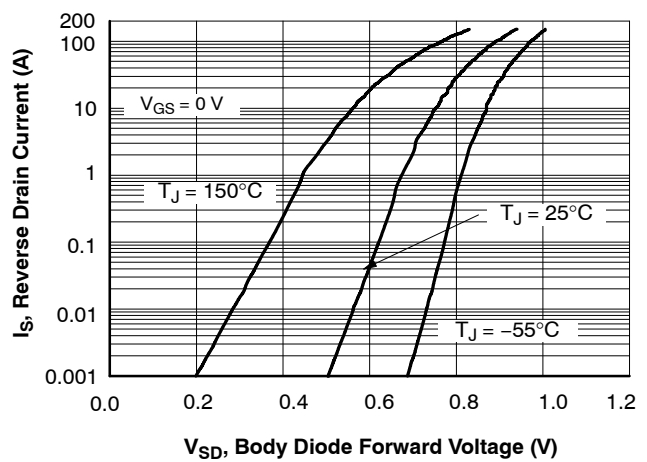


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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TYPICAL CHARACTERISTICS (continued)

($T_J = 25^\circ\text{C}$ unless otherwise noted)

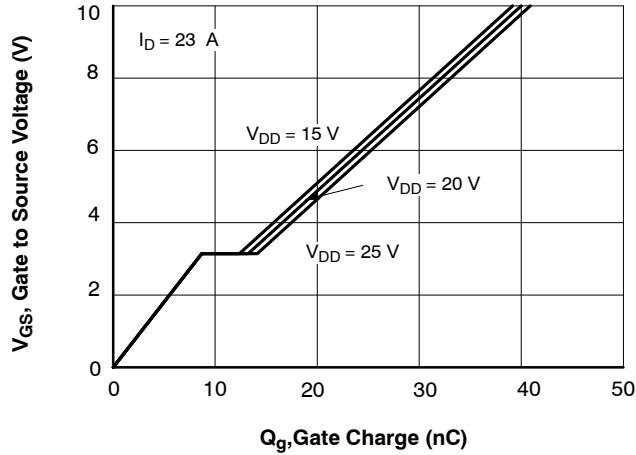


Figure 7. Gate Charge Characteristics

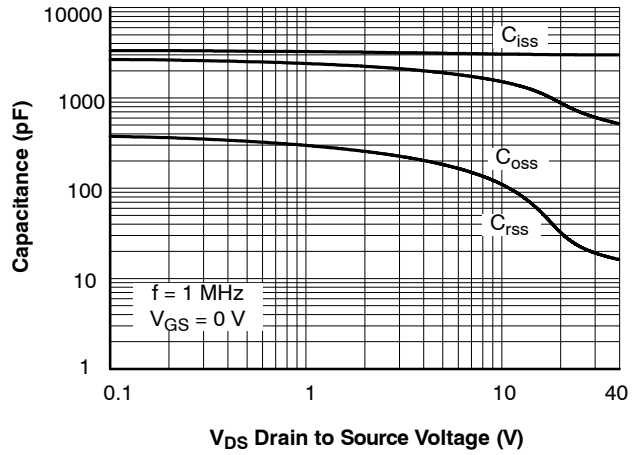


Figure 8. Capacitance vs Drain to Source Voltage

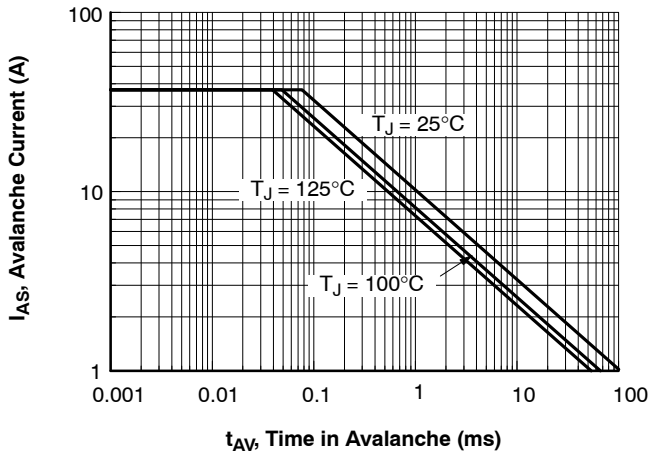


Figure 9. Unclamped Inductive Switching Capability

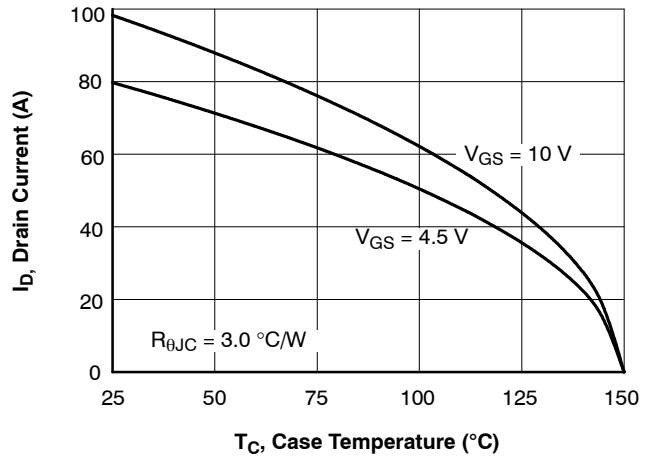


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

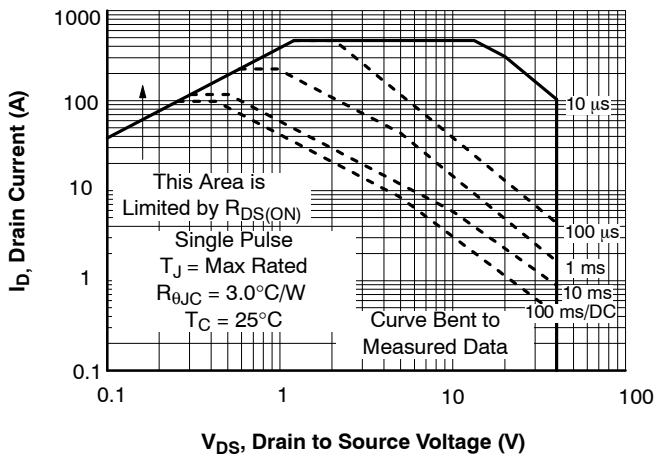


Figure 11. Forward Bias Safe Operating Area

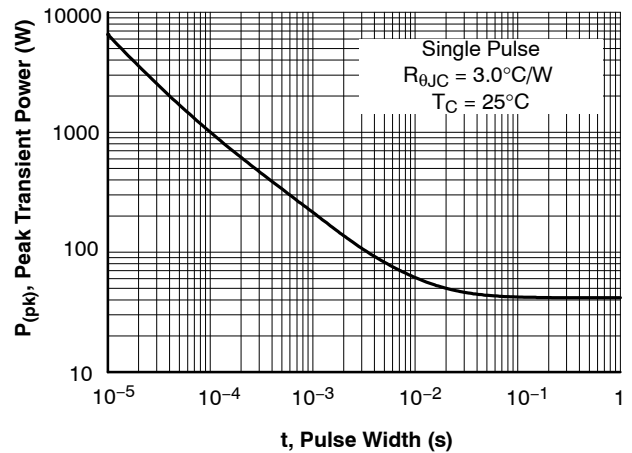


Figure 12. Single Pulse Maximum Power Dissipation

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TYPICAL CHARACTERISTICS (continued)

($T_J = 25^\circ\text{C}$ unless otherwise noted)

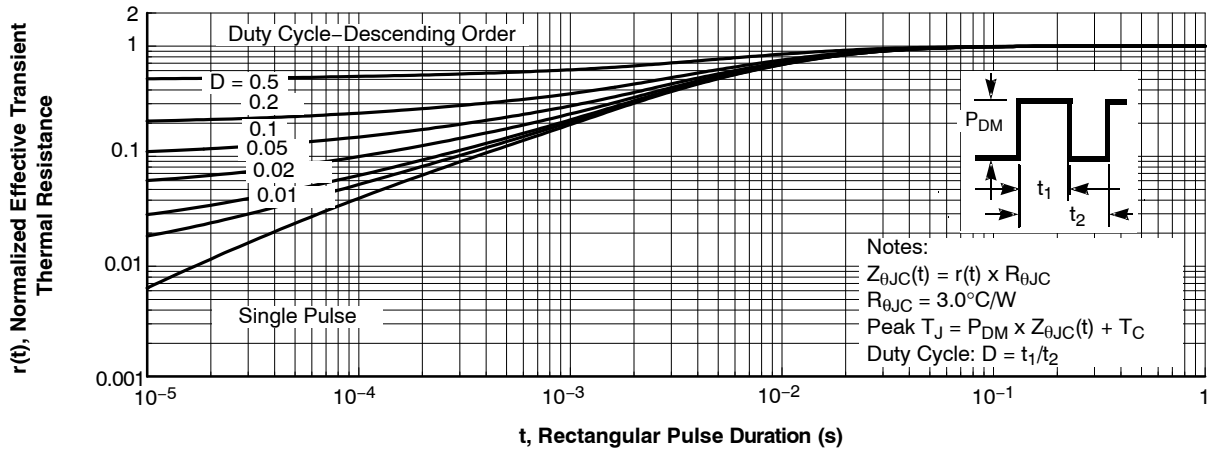


Figure 13. Junction-to-Case Transient Thermal Response Curve

MECHANICAL CASE OUTLINE

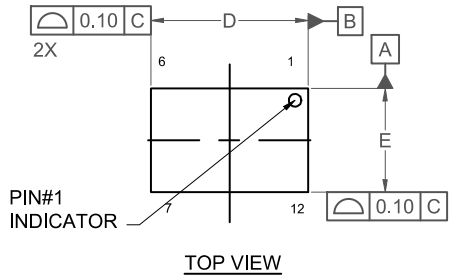
PACKAGE DIMENSIONS

ON Semiconductor®

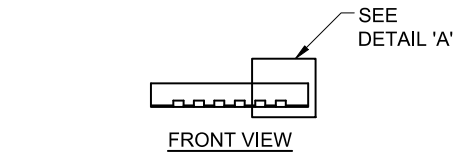


PQFN12 3.3X5, 0.65P CASE 483BN ISSUE A

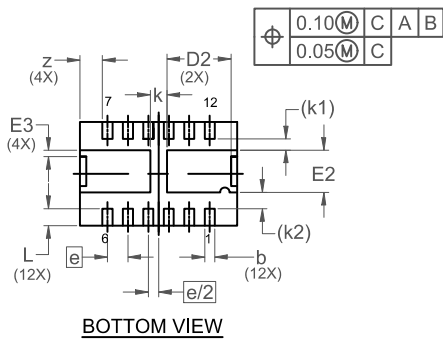
DATE 26 AUG 2021



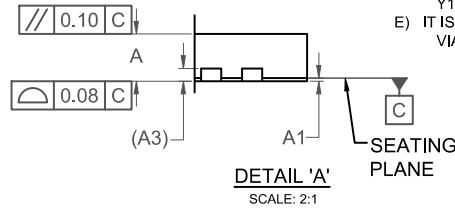
TOP VIEW



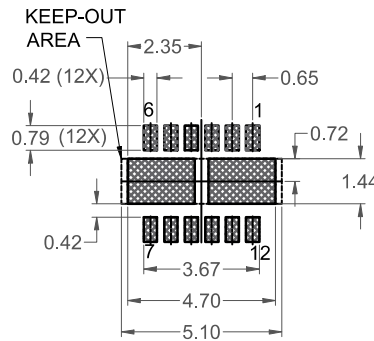
FRONT VIEW



BOTTOM VIEW



DETAIL 'A'
SCALE: 2:1



LAND PATTERN
RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERM/D.

- NOTES: UNLESS OTHERWISE SPECIFIED
- A) THIS PACKAGE CONFORMS TO JEDEC MO-240, VARIATION BA.
 - B) ALL DIMENSIONS ARE IN MILLIMETERS.
 - C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
 - D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
 - E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

| DIM | MILLIMETERS | | |
|-----|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.80 |
| A1 | 0.00 | - | 0.05 |
| A3 | 0.20 REF | | |
| b | 0.27 | 0.32 | 0.37 |
| D | 4.90 | 5.00 | 5.10 |
| D2 | 1.92 | 2.04 | 2.14 |
| E | 3.20 | 3.30 | 3.40 |
| E2 | 1.24 | 1.34 | 1.44 |
| E3 | 0.10 | 0.20 | 0.30 |
| e | 0.65 BSC | | |
| e/2 | 0.325 BSC | | |
| k | 0.53 REF | | |
| k1 | 0.36 REF | | |
| k2 | 0.52 REF | | |
| L | 0.44 | 0.54 | 0.64 |
| z | 0.72 REF | | |

| | | |
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